AMENDMENT

In the claims:

1. (Currently amended) A method of compensating for channel inversions comprising:

determining a sign of a frame, wherein the frame has an associated modulus, N;

differentially encoding the sign of the frame;

differentially encoding the frame by selectively inverting the frame in response to the differentially encoded sign of the frame, adding the selectively inverted frame to a prior encoded frame, and performing a modulo N reduction; and,

transmitting a channel output having the differentially encoded frame,

wherein the sign of the frame is set to zero if $R_0 < N/2$ and the sign of the frame is set to one if $R_0 > N/2$, and the sign of the frame is set to either one or zero if $R_0 = N/2$, where R_0 is a value of the frame and N is a product of a plurality of moduli used to form the channel output.

2. (Cancelled)

3. (Cancelled)

4. (Previously presented) The method of Claim 1, wherein the sign of the frame is differentially encoded using the equation:

$d(n) = [s(n) + d(n-1)]_{\text{mod } 2}$.

5. (Previously presented) The method of Claim 1, wherein the value of the frame is differentially encoded using the equation:

$$D(n)=[D(n-1)+N+(-1)^{d(n-1)}R_0]_{\mathrm{mod}\,N}.$$

6. (Previously presented) The method of Claim 1, wherein the output is differentially decoded using the equation:

$$R_0=[N+(-1)^{r(n-1)}R(n)]_{\mathrm{mod}\,N}.$$

7. (Previously presented) The method of Claim 1, further comprising translating the differentially encoded frame into symbols.

8. (Previously presented) The method of Claim 1, wherein the sign of the frame and the value of the frame are differentially decoded.

9. (Currently amended) A method of compensating for a phase shift in a modem comprising:

attributing a sign to a frame of constellation points, where the frame has an associated modulus, N;

differentially encoding the frame by selectively inverting the frame in response to a differentially encoded sign of the frame, adding the selectively inverted frame to a prior encoded frame, and performing a modulo N reduction; and

differentially decoding the frame by (i) selectively inverting the differentially encoded frame (ii) adding the selectively inverted frame to the modulus N, and (iii) performing a modulo N reduction;

wherein the sign of the frame is set to zero if $R_0 < N/2$ and the sign of the frame is set to one if $R_0 > N/2$, and the sign of the frame is set to either one or

zero if $R_0 = N/2$, where R_0 is a value of the frame and N is a product of a plurality of moduli used to form the channel output.

10. (Cancelled)

11. (Cancelled)

12. (Previously presented) The method of Claim 9, wherein the differential decoding is performed after being supplied to a multiple modulus decoder.

13. (Previously presented) The method of Claim 9, the frame is differentially encoded before being supplied to a multiple modulus encoder.

14. (Cancelled)

15. (Previously presented) The method of Claim 1, wherein the differential decoding is performed after being supplied to a multiple modulus decoder.

16. (Previously presented) The method of Claim 1, the frame is differentially encoded before being supplied to a multiple modulus encoder.

17. (Cancelled)

18. (Cancelled)

19. (Cancelled)

20. (Previously presented) A method of using differential encoding for a communication, the method comprising:

determining a sign of a frame;

differentially encoding the sign of the frame;

applying the differentially encoded sign to the frame so as to produce a first encoded frame;

differentially encoding the first encoded frame so as to produce a second encoded frame; and

transmitting a channel output comprising the second encoded frame.

21. (Previously presented) The method of Claim 20, wherein the sign of the frame is set to zero if $R_0 <= N/2$ and the sign of the frame is set to one if $R_0 > N/2$, where R_0 is a value of the frame and N is a product of a plurality of moduli used for transmitting the channel output.

22. (Previously presented) The method of Claim 20, wherein the sign of the frame is set to zero if $R_0 < N/2$ and the sign of the frame is set to one if $R_0 => N/2$, where R_0 is a value of the frame and N is a product of a plurality of moduli used for transmitting the channel output.

23. (Previously presented) The method of Claim 20, wherein the sign of the frame is differentially encoded using the equation:

$d(n) = [s(n) + d(n-1)]_{\text{mod } 2}$.

24. (Previously presented) The method of Claim 20, wherein the value of the frame is differentially encoded using the equation:

$$D(n) = [D(n-1) + N + (-1)^{d(n-1)} R_0]_{\mathrm{mod}\, N}.$$

25. (Previously presented) The method of Claim 20, wherein the output is differentially decoded using the equation:

$$R_0 = [N + (-1)^{r(n-1)} R(n)]_{\mathrm{mod}\, N}.$$

26. (Previously presented) The method of Claim 20, further comprising translating the differentially encoded frame into symbols using a plurality of moduli.

27. (Currently Amended) A method of using differential encoding for a communication, the method comprising:

receiving a channel output comprising a first encoded frame, wherein the first encoded frame comprises a differentially encoded second-encoded frame, and wherein the second-encoded frame comprises a differentially encoded sign of a frame applied to such frame;

differentially decoding a sign of the channel output to obtain a decoded sign sequence; and

differentially decoding the channel output so as to obtain ~~the frame, wherein the differentially decoded sign of the frame and frame provide the frame with the proper sign~~ a differentially decoded frame containing possible sign inversions; and,

applying the decoded sign sequence to the differentially decoded frame to eliminate the possible inversions and to thereby obtain the frame.

28. (Previously presented) The method of Claim 27, wherein the sign of the frame is set to zero if $R_0 <= N/2$ and the sign of the frame is set to one if $R_0 > N/2$, where

R_0 is a value of the frame and N is the a product of a plurality of moduli used for generation of the channel output.

29. (Previously presented) The method of Claim 27, wherein the sign of the frame is set to zero if $R_0 < N/2$ and the sign of the frame is set to one if $R_0 => N/2$, where R_0 is a value of the frame and N is a product of a plurality of moduli used for generation of the channel output.

30. (Previously presented) The method of Claim 27, wherein the sign of the frame is differentially encoded using the equation:

$$d(n) = [s(n) + d(n-1)]_{\bmod 2}.$$

31. (Previously presented) The method of Claim 27, wherein the value of the frame is differentially encoded using the equation:

$$D(n) = [D(n-1) + N + (-1)^{d(n-1)} R_0]_{\bmod N}.$$

32. (Previously presented) The method of Claim 27, wherein the output is differentially decoded using the equation:

$$R_0 = [N + (-1)^{r(n-1)} R(n)]_{\bmod N}.$$

33. (Previously presented) The method of Claim 27, further comprising translating the differentially encoded frame into symbols.